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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/512,119	10/21/2004	Matthias Wendt	DE 020103	2393

24738 7590 09/12/2007

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EXAMINER	
ROSENAU, DEREK JOHN	
ART UNIT	**PAPER NUMBER**
2834	

MAIL DATE	DELIVERY MODE
09/12/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/512,119	WENDT ET AL.	
	Examiner	Art Unit	
	Derek J. Rosenau	2834	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *24 July 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *10 and 12-30* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *10,12-22 and 26* is/are rejected.

7)☒ Claim(s) *23-25 and 27-30* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Objections

1. Claim 26 is objected to because of the following informalities: "an adjustable time-delay element adapted receive" should be "an adjustable time-delay element adapted to receive". Appropriate correction is required.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 10-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sakurai (US 4965532) in view of Sakurai et al. (US 6569109).

4. With respect to claim 10, Sakurai discloses a starting-process controller for starting a piezomotor (Fig 3), comprising: a voltage-controlled oscillator (item 17), a power output stage (item 13), a resonance converter (column 9, lines 39-46), a phase comparator (item 15), a phase-locked loop filter (item 16), and an adjustable time-delay element (item 12), wherein the VCO generates the control signals required for the power output stage (Fig 3), the power output stage provides stepped output voltage (column 9, lines 39-46), the resonance converter converts the stepped output voltage from the power output stage into a motor voltage for driving the piezomotor (column 9, lines 39-46), the motor voltage being sinusoidal and having an associated motor current when the piezomotor is driven (column 9, lines 39-46), the phase-locked loop filter is

configured to smooth the phase-difference signal so as to provide a smoothed signal that controls the VCO (column 13, lines 5-12), and the adjustable time-delay element providing for controlled reduction of the phase difference between the motor voltage and a reference in a start-up process for starting up the piezomotor from an initially large starting angle at initiation of the start-up process towards a smaller operating angle at an operating point, the adjustable time-delay element effecting reduction in the form of one of: (i) a preset linear gradient, the linear gradient having a preset starting delay, a preset final delay, and a preset, fixed change in delay per selected time increment over the duration of the start-up process, such that, at initiation of the start-up process, the starting delay applies to generate a start-up phase angle toward enabling reliable start-up of the piezomotor and, at the operating point, the final delay applies to generate an operating phase angle toward enabling reliable operation of the piezomotor (column 7, line 48 through column 8, line 16), or (ii) ..., or (iii) a preset combination of a linear gradient and a progressive curve.

Sakurai does not disclose expressly that the phase comparator compares the motor current with the phase of the motor voltage, and provides a phase-difference signal representing a measure of the phase difference between motor current and the motor voltage.

Sakurai et al. teaches a controller for a piezoelectric device in which a phase comparator compares the motor current with the phase of the motor voltage, and provides a phase-difference signal representing a measure of the phase difference between motor current and the motor voltage (column 12, lines 50-55).

At the time of invention, it would have been obvious to a person of ordinary skill in the art to combine the voltage-current phase comparator of Sakurai et al. with the starting-process controller of Sakurai for the benefit of eliminating the need for the reference signal, thus reducing the number of components required.

5. With respect to claim 11, the combination of Sakurai and Sakurai et al. discloses the starting-process controller as claimed in claim 10. Sakurai discloses that the reduction in phase angle during the start-up process is in the form of a ramp (column 7, lines 56-62 and Figures 8A-8D). The reference frequency, which is phase locked with the voltage, is varied monotonously, which results in the phase angle being varied in the form of a ramp.

6. With respect to claim 12, the combination of Sakurai and Sakurai et al. discloses the starting-process controller of claim 10. Sakurai et al. discloses that the adjustable-time delay element comprises a digital counter (item 123), and wherein the digital counter effects the controlled reduction in phase angle between the motor voltage and the motor current in the form of the linear gradient, the progressive curve, or the combination of such gradient and curve (column 12, line 50 through column 13, line 23).

7. With respect to claim 13, the combination of Sakurai and Sakurai et al. discloses the starting-process controller of claim 12. Sakurai et al. discloses that, at selected times during the start-up process, the digital counter has respective starting values such that the starting value of the digital counter at a particular selected time fixes the respective delay as to the motor current, the delay generating a phase angle at such selected time (column 12, line 50 through column 13, line 23).

8. With respect to claim 14, the combination of Sakurai and Sakurai et al. discloses the starting-process controller of claim 13. Sakurai et al. discloses that the digital counter counts from each starting value to a preset final count, the final count being associated with the passing on of the motor current subject to the respective delay (column 12, line 50 through column 13, line 23).

9. With respect to claim 15, the combination of Sakurai and Sakurai et al. discloses the starting-process controller of claim 13. Sakurai et al. discloses a start-up process delay controller (item 125), the start-up process delay controller controlling the adjustable time-delay element by one or both of (i) providing the starting values to the digital counter of the adjustable time-delay element (column 13, lines 7-9) and/or (ii) having a timing interval associated with the selected time increment between changes in delay.

10. With respect to claim 16, the combination of Sakurai and Sakurai et al. discloses the starting-process controller of claim 10. Sakurai et al. discloses a start-up process delay controller (item 125), the start-up process delay controller controlling the adjustable time-delay element by one or both of (i) providing one or more of the starting delay, the final delay and/or the change in delay (column 13, lines 7-14).

11. With respect to claim 17, the combination of Sakurai and Sakurai et al. discloses the starting-process controller of claim 16. Sakurai et al. discloses that the start-up process delay controller comprises a reference counter that counts oscillations of a reference frequency, the reference frequency forming a clock signal of the reference counter (column 12, line 50 through column 13, line 23).

12. With respect to claim 18, the combination of Sakurai and Sakurai et al. discloses the starting-process controller of claim 17. Sakurai et al. discloses that the counts made by the reference counter are used directly for setting the delay (column 12, line 50 through column 13, line 23).

13. With respect to claim 19, the combination of Sakurai and Sakurai et al. discloses the starting-process controller of claim 17. Sakurai et al. discloses that the counts made by the reference counter are converted into a value for setting the delay (column 12, line 50 through column 13, line 23).

14. With respect to claim 20, the combination of Sakurai and Sakurai et al. discloses the starting-process controller of claim 17. Sakurai et al. discloses that the counts made by the reference counter are converted into settings for the delay by means of a table of a memory device (item 125 and column 12, line 50 through column 13, line 23).

15. With respect to claim 21, the combination of Sakurai and Sakurai et al. discloses the starting-process controller of claim 10. Sakurai et al. discloses that the starting process is monitored by a programmable control device (item 125).

16. With respect to claim 22, the combination of Sakurai and Sakurai et al. discloses the starting-process controller of claim 21. Sakurai et al. discloses that the programmable control device monitors the phase delay digitally (CPU 125 is a digital computer).

17. Claim 26 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sakurai.

18. With respect to claim 26, the "adapted to" limitations have not been given patentable weight, as they do not positively recite any structural elements. Sakurai

discloses a starting-process controller for starting a piezomotor (Fig 3), comprising: a voltage controlled oscillator (item 17) adapted to generate a control signal (Fig 3); a power output stage (item 13) adapted to receive the control signal from the VCO (Fig 3) and in response thereto generate a stepped output voltage (column 9, lines 39-46); a resonance converter (column 9, lines 39-46) adapted to convert the stepped output voltage from the power output stage into a motor voltage for driving the piezomotor (column 9, lines 39-46), the motor voltage being sinusoidal and having an associated motor current when the piezomotor is driven (column 9, lines 39-46); an adjustable time-delay element (item 12) adapted to receive the motor current and to delay the motor current by a delay amount; a phase comparator (item 15) adapted to receive the motor voltage and the delayed motor current from the adjustable time-delay element, and to output a phase-difference signal representing a measure of a phase difference between t he delayed motor current and the motor voltage; and a phase-locked loop filter (item 16) adapted to filter the phase-difference signal and to apply the phase-difference signal to the VCO (Fig 3).

Allowable Subject Matter

19. Claims 23-25 and 27-30 objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

20. The following is a statement of reasons for the indication of allowable subject matter: the prior art does not disclose or suggest "wherein an output of the adjustable time-delay element is directly connected to an input of the phase comparator," or

"wherein the adjustable time-delay element delays only one of the motor voltage and the motor current, and provides the delayed one of the motor voltage and the motor current to the input of the phase comparator," or "wherein the adjustable time-delay element includes a binary counter whose output is provided to the input of the phase comparator" in combination with the remaining claim elements of claims 23, 24, and 25 respectively.

Response to Arguments

21. Applicant's arguments filed 24 July 2007 have been fully considered but they are not persuasive. Applicant argues that Sakurai does not disclose an adjustable time-delay element as required in claim 10. However, the phase-locked loop of Sakurai adjusts the output signal such that it reduces the phase difference between the motor voltage and the motor current during operation, including during the start-up process, from a large initial angle toward a smaller angle at the operation point (column 7, line 48 through column 8, line 16). So, while Sakurai may not directly affect a time-delay in the current and/or voltage, it indirectly does so in its adjustments to the output signal, which are illustrated in Figures 8A-8D. Applicant argues that nothing in Sakurai provides for controlled reduction of the phase difference between the motor voltage and voltage current in a start-up process for starting a piezomotor from a large starting angle at initiation of the start-up process towards a smaller operating angle at an operating point. In support of this argument, applicant points to Figures 8A-8D as showing the cyclical variation of $\Delta\theta$; however, figures 8A-8D are a frequency based plot, and not a time-based plot of $\Delta\theta$. However, as described above, this feature can be seen in the section

of Sakurai beginning at column 7, line 48 and ending at column 8, line 16. Applicant argues that Sakurai is not concerned with the reduction of the phase difference between the motor voltage and motor current in a start-up process for starting a piezomotor, and is only concerned with locking the PLL frequency to the resonant frequency. Sakurai is concerned with locking the PLL to the resonant frequency, but it does so by reducing the phase difference between the voltage and current, as described in Sakurai at column 7, line 48 through column 8, line 16. Applicant argues that Sakurai does not disclose that the phase difference between the motor voltage and motor current is reduced in w=either in the form of (1) a preset linear gradient, (2) a progressive curve where, as the operating point is neared, the change in delay per selected time increment becomes progressively smaller, or (3) a combination of the two. However, as can be seen at column 7, line 48 through column 8, line 16, the reference frequency, and therefore the phase difference, is varied monotonously, which would meet both (1) and (3).

Conclusion

22. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any

extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Derek J. Rosenau whose telephone number is 571-272-8932. The examiner can normally be reached on Monday thru Thursday 7:00-5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Darren Schuberg can be reached on 571-272-2044. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Derek J Rosenau
Examiner
Art Unit 2834

DJR
8/30/2007

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